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(54) **Scaffold joint**

(57) A scaffold joint between an upright and a transome comprises a U-shaped socket 16, 116 on the upright which receives an end portion of the transome and a wedge 20, 120 which extends downwardly from one side wall of the socket through the end portion of the transome and through an opening in the other side wall of the socket. The wedge is arranged to urge the transome horizontally towards the upright and downwardly into the socket.

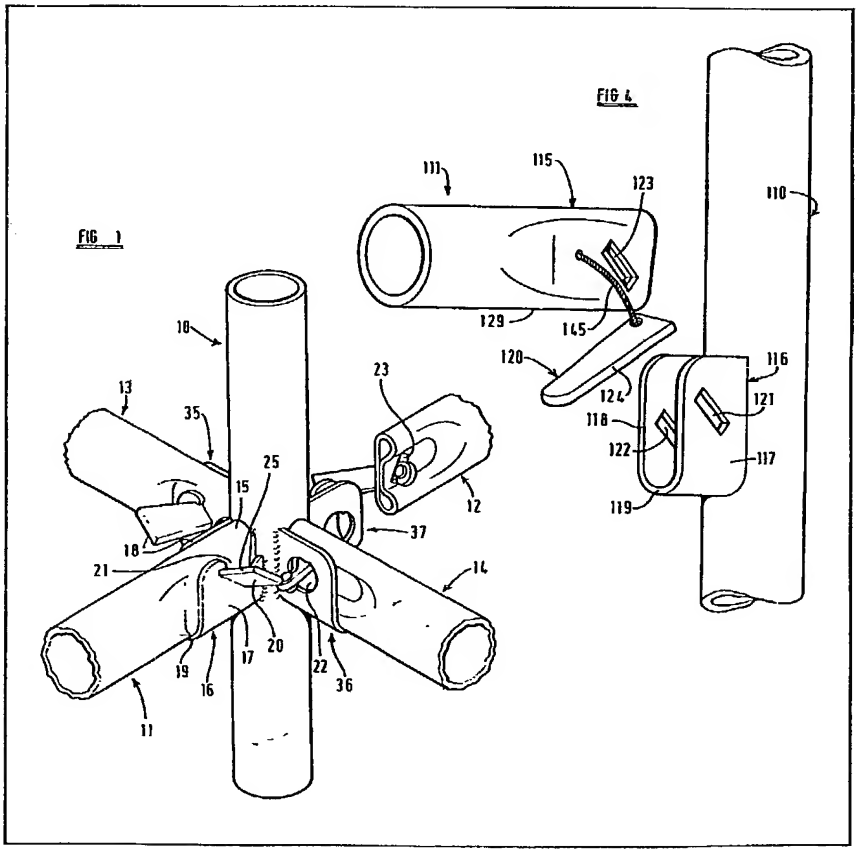

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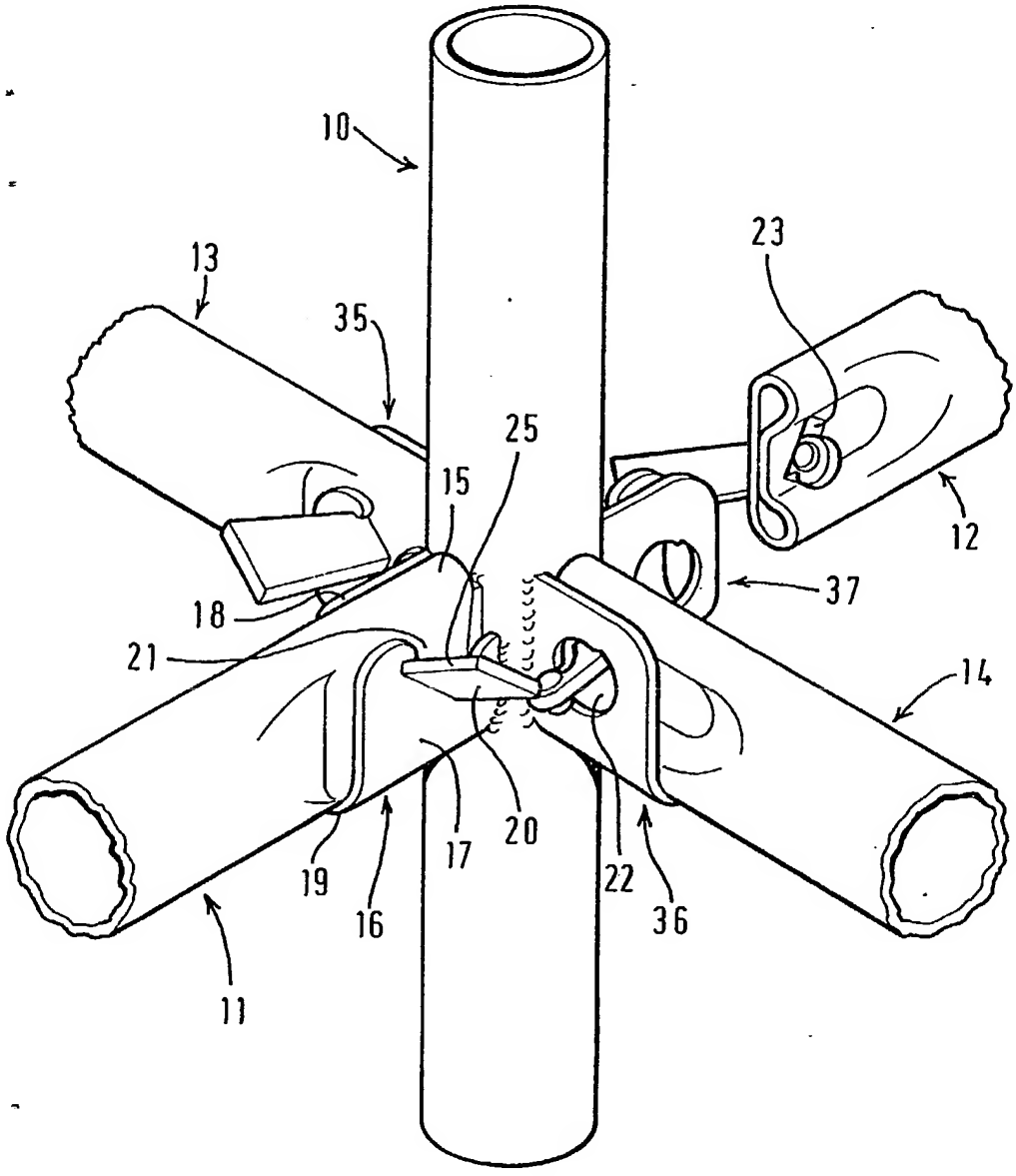
FIG 1



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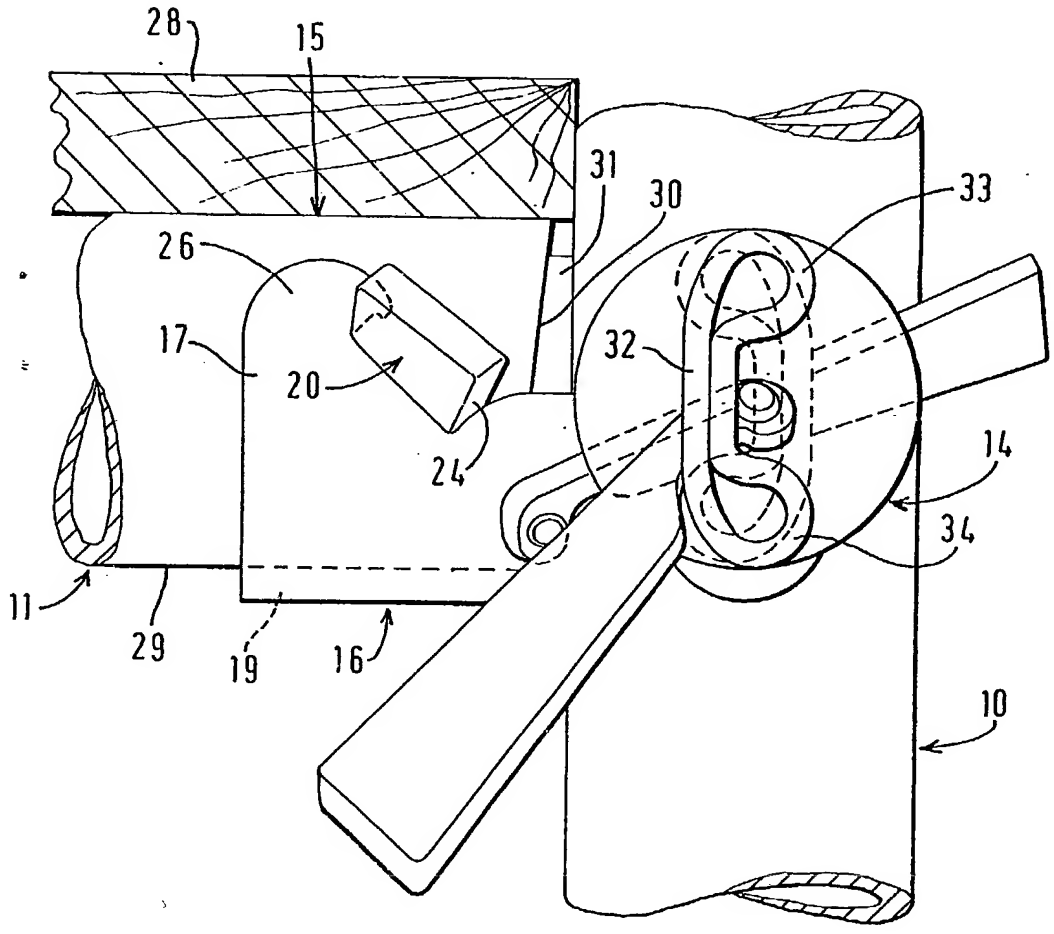

FIG 2

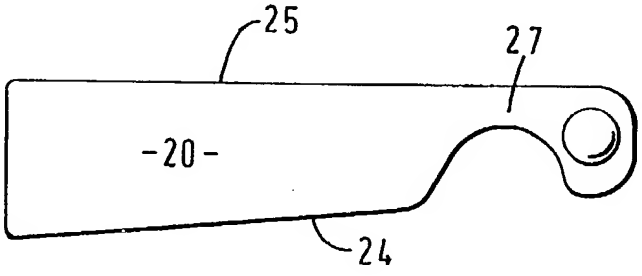

FIG 3

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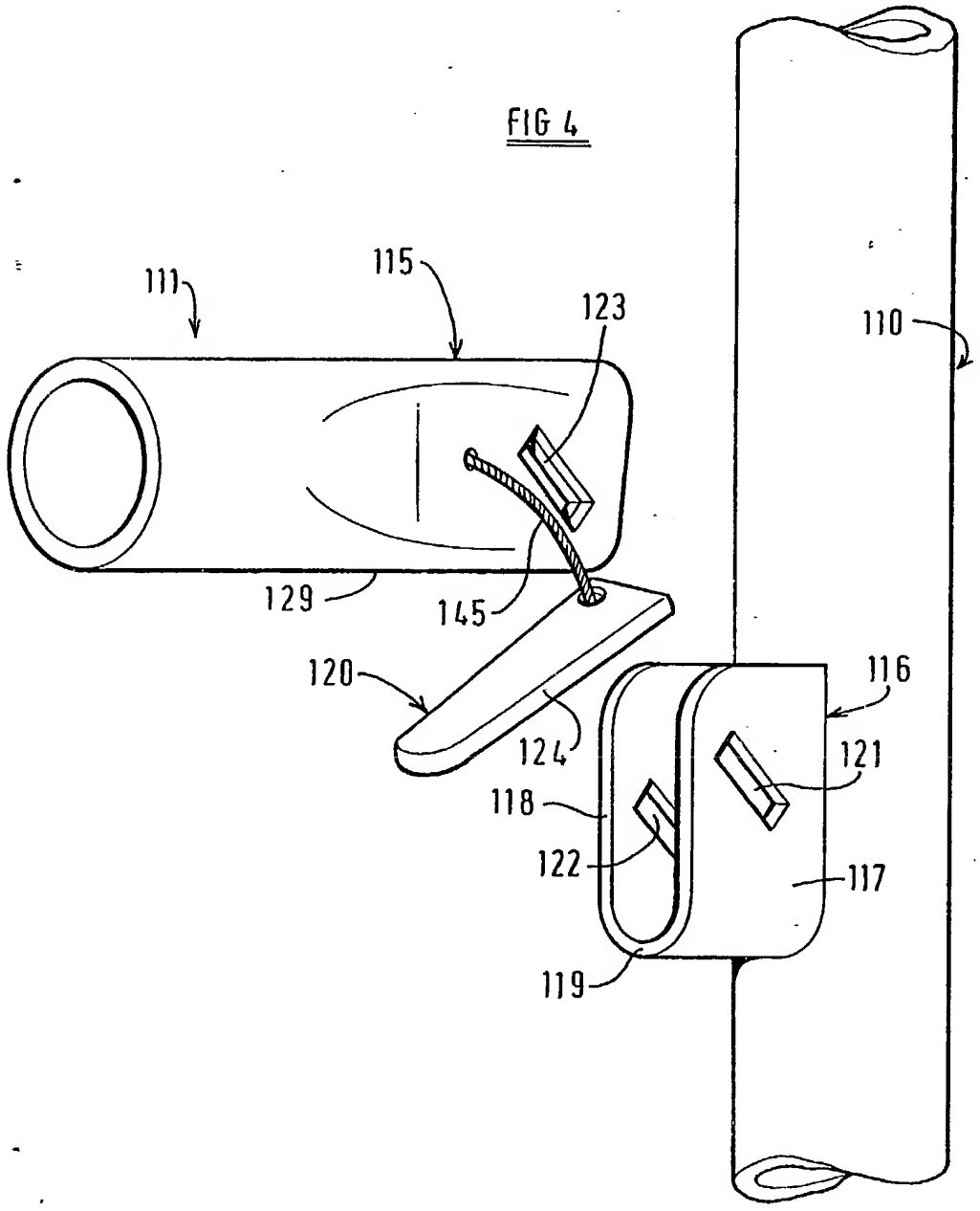
FIG 4



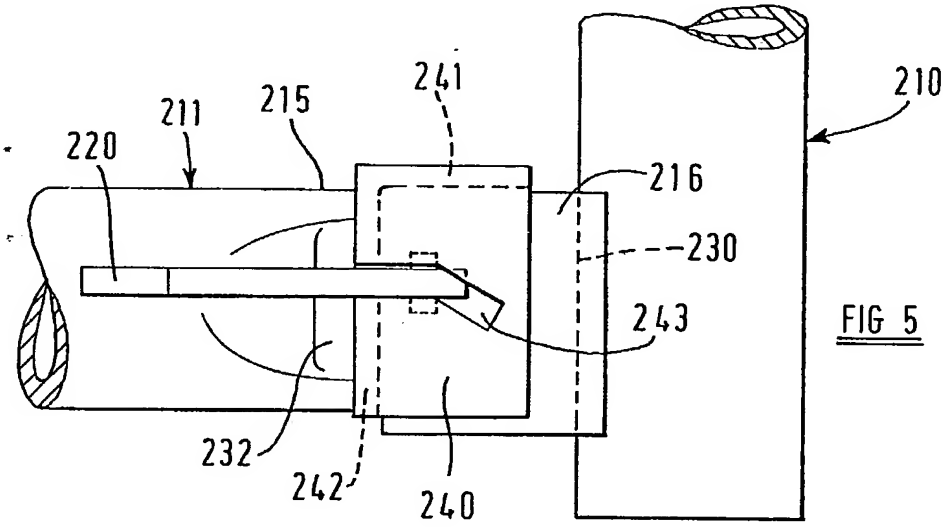

241
211
215
210
220
216
230
243
232
242
240

FIG 5

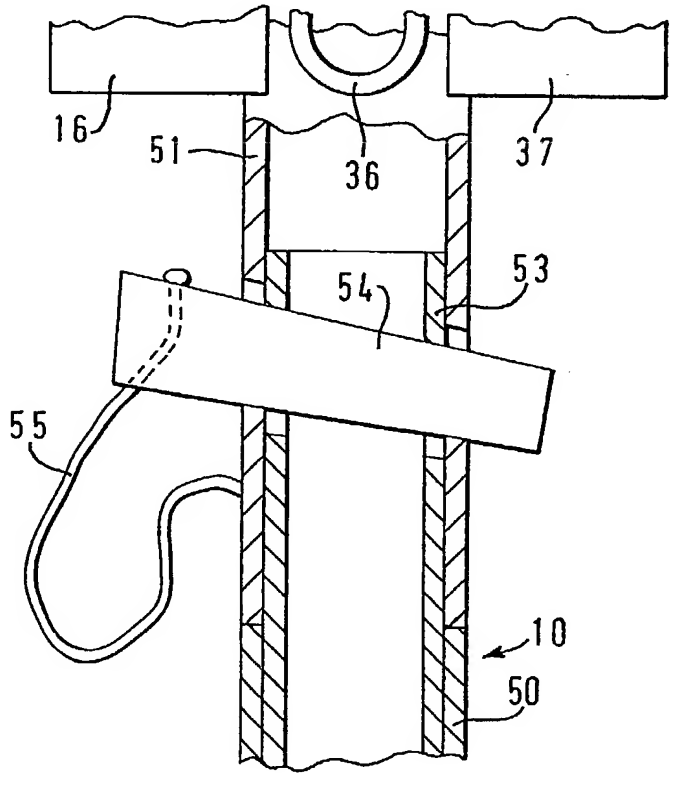

16
51
36
37
53
54
55
10
50

FIG 6

SPECIFICATION

Scaffold joint

Description of invention

This invention relates to scaffolding comprising an upright member and a plurality of transverse members connected to the upright member by respective joints.

The most common use of scaffolding of the kind specified is the provision of working platforms above ground level. The working platforms above ground level. The working platforms normally comprise a plurality of boards which rest on horizontal members of the scaffolding called transomes. The scaffolding normally comprises further horizontal members which run parallel to the boards and are called ledgers. A common form of joint in scaffolding of the kind referred to comprises a wedge which is driven vertically downwards to tighten the joint. An upper end portion of the wedge projects above the upper edge of the associated transome and so prevents a board lying on the upper edge of the transome close to the upright member. It is therefore common for each transome to support end portions only of the boards, these resting on lower flanges of the transomes. This arrangement severely restricts the sizes of boards which can be used.

According to the present invention, there is provided in scaffolding comprising an upright member and a plurality of transverse members connected to the upright member by respective joints, a joint between the upright member and a transverse member, which joint comprises a pair of horizontally spaced side walls on one member, a portion of the other member which is received between the side walls and a retaining element which is driven along a path extending from one side wall to the other side wall into an operative position in which the retaining element is engaged with both of the side walls and with said portion in a manner to retain said portion in a predetermined position relative to the side walls.

With this arrangement, the retaining element is not driven vertically downwards into its operative position and is not required to project above an upper edge of the transverse member. If required, a board which extends past the transverse member can rest on an upper edge of the transverse member close to the upright member.

The joint may further comprise any one or more of the following features.

The joint may further comprise respective load-transmitting surfaces on said members which surfaces engage each other to limit downward movement of the transverse member relative to the upright member.

The load transmitting surface on said one member may extend between the side walls. The load transmitting surface on said one member may face towards or away from a gap between the side walls. In the former case, the load transmitting surface may be at lower ends of the walls and, in the latter case, the load transmitting surface may be at the upper ends of the side walls. In either case, the load transmitting surface on said one member may be on a transverse wall which, together with the side walls, forms a socket which is generally of U-shape or of inverted U-shape. The extremity of the socket which is remove from the transverse wall may be open.

The side walls may be provided on the upright member. An end portion of the transverse member may be received between the walls. Said end portion may be integral with a tubular portion of the transverse member and formed by deformation of an end portion of a tube. Said end portion may include upper and lower ribs which project laterally from an intermediate part of the end portion. The intermediate part of the end portion may be substantially flat and may be disposed vertically. The ribs may be hollow and may be in the form of rounded beads.

The joint may further comprise respective abutment surfaces on said members which engage each other to limit movement of the transverse member towards the upright member. The abutment surface of the transverse member may be an end face of the transverse member. The abutment surfaces may be so inclined to the vertical that vertically upward movement of the transverse member relative to the upright member eliminates engagement between the abutment surfaces.

In a case where both the load transmitting surfaces and abutment surface are provided, mutual engagement of the load transmitting surfaces together with mutual engagement of the abutment surfaces, contributes significantly to the rigidity of the joint.

The retaining element may be of elongate form and the side walls may be spaced apart along its length. The retaining element may have a longitudinal centre line which is inclined downwardly. With this arrangement gravity tends to move the retaining element longitudinally.

The retaining element may be a wedge. The narrower end of the wedge may be lower than the wider end, when the wedge is in its operative position. The wedge may be so arranged that a plane which constitutes the longitudinal centre line of the wedge and intersects both of the mutually inclined wedging faces is inclined downwardly in a direction from one side wall towards the other side wall and is also inclined downwardly in a direction towards the upright member. With this arrangement, when the wedge is driven towards its operative position, it urges the load transmitting surfaces into mutual contact and also urges the abutment surfaces into mutual contact.

The retaining element may be received in respective apertures formed in said end portion and in at least one of the side walls. The other side wall may be formed with an opening to receive the retaining element without encircling the retaining element so that the retaining element can be introduced into and removed from the opening by movement of the retaining element in directions transverse to its length. Such openings may be formed in both side walls. The opening in the or each side wall may be defined in part by a hook-shaped portion of the wall, the wedge including a portion which is sufficiently narrow to clear the hook-shaped portion of the wall

when the narrow portion ocf the wedge lies in the opening. The arrangement may be such that, when the wedge is in its operative position, the hook-shaped portion overlies only a part of the width of the wedge as viewed in plan.

The retaining element may be captive in one member. The retaining element may be long enough to protrude from both side walls at the same time. This arrangement enables a visual check to be made as to whether the retaining element is in its operative position.

The scaffolding preferably includes a plurality of joints in accordance with the invention at the same position along the length of an upright member. Preferably, these joints are arranged indiametrically opposite pairs.

In a case where there are provided four or more joints at the same position along the length of the upright member and each joint comprises one apertured side wall and one side wall with an opening, the apertured side walls are preferably higher than the walls with openings and each apertured wall is preferably arranged adjacent to that wall of an adjacent socket which is formed with an opening. It will be understood that the provision of the opening weakens the side wall more than does the provision of an aperture. The presence of a higher, apertured wall adjacent to a wall formed with an opening ensures some degree of protection for the wall with an opening against mechanical damage.

Three examples of scaffolding embodying the invention will now be described with reference to the accompanying drawings wherein:-

Figure 1 illustrates the first example and shows a perspective view of a part of an upright member and parts of four transverse members, three of which are joined to the upright member and one of which is separated therefrom,

Figure 2 shows an elevation of a part of the first example of scaffolding, as viewed along the length of one of the transverse members of Figure 1,

Figure 3 shows an elevation of a wedge incorporated in each of the joints of the first example of scaffolding,

Figure 4 illustrates the second example of scaffolding and shows a perspective view of a part of an upright member and a part of a single transverse member prior to joining with the upright member,

Figure 5 illustrates the third example of scaffolding and shows an elevation of a part of an upright member thereof, together with a part of an associated transverse member, and

Figure 6 illustrates a joint in the upright members of each example of scaffolding.

The scaffolding illustrated in Figures 1, 2 and 3 of the accompanying drawings comprises a plurality of upright members, one of which is shown at 10, and a plurality of transverse members, four of which are shown at 11 to 14. The members 13 and 14 may be ledgers, the members 11 and 12 being transomes on which there rest boards, as shown in Figure 2, to provide working platforms. The transomes and ledgers are horizontal and therefore perpendicular to the upright member 10.

The ledgers 13 and 14 and the transome 11 are joined to the upright member 10 at the same position along the length thereof. The transome 12 may also be joined to the upright member. Alternatively, the transome 12 may not be used, depending upon the particular scaffolding arrangement required.

The joints between the transomes 11 and 12 and the upright member 10 and the joints between the ledgers 13 and 14 and the upright member 10 are substantially identical and therefore only the joint between the transome 11 and the upright member will be described in detail. This joint comprises an end portion 15 of the transome which is received in an open-topped socket 16 welded to the upright member. The socket comprises a pair of side walls 17 and 18 which are parallel to each other and are connected at their lower ends by a transverse wall 19. As viewed along the length of the transome 11 towards the upright member 10, the socket 16 is generally U-shaped. The joint further comprises an elongate retaining element in the form of a wedge 20 for releasably retaining the end portion 15 in the gap between the side walls 17 and 18. When the wedge is in the operative position shown in Figure 1, it extends through an opening 21 in the side wall 17, through a slot in the end portion 15 and through an aperture 22 in the side wall 18. The slot of the end portion 15 is not visible in Figure 1 but the corresponding slot of the transome 12 is indicated by the reference numeral 23. The slot is closed at both of its ends and has a length somewhat less than the width of the wedge 20 at its wider end. At the end of the wedge remote from its wider end, there are provided lateral projections which maintain the wedge captive in the slot of the transome. The aperture 22 in the side wall 18 is not visible in Figure 1 but the corresponding aperture associated with the ledger 13 is indicated by the same reference numeral.

The aperture 22 in the side wall 18 is sufficiently large to enable the lateral projections on the wedge 22 to pass through the aperture so that the wedge can be withdrawn longitudinally therefrom. The slot in the end portion 15 is arranged with its length inclined at an angle of approximately 45° to a longitudinal axis of the transome 11. Thus, the wedge 20 is maintained in an attitude such that its mutually inclined wedging faces 24 and 25 are at different distances from the upright member 10, the lower wedging face 24 being nearer to the upright member than is the upper wedging face 25. The opening 21 in the side wall 17 is defined in part by a hook-shaped portion 26 of the side wall, this hook-shaped portion embracing the upper wedging face 25. As is evident from Figure 2, when the wedge is in its operative position and the joint is viewed in plan, the hook-shaped portion embracing the upper wedging face 25. As is evident from Figure 2, when the wedge is in its operative position and the joint is viewed in plan, the hook-shaped portion 26 overlies only an upper part of the wedge adjacent to its upper wedging face 25. A lower part of the wedge adjacent to the wedging face 24 is not overlain by any part of the side wall 17. When the wedge is withdrawn from the aperture 22, a narrow part 27 of the wedge lies in

the slot in the end portion 15 so that the edge 25 can be moved towards the upright member 10 to clear the hook-shaped wall portion 26 and the wedge can then be with-drawn from the opening in the vertical direction.

In the assembled joint, the relative positions of the slot in the end portion 15, the boundaries of the opening 21 which are engaged by the wedge and the boundary surfaces of the aperture 22 which are engaged by the wedge are such that the narrower end of the wedge is lower than its wider end and that a plane which contains the longitudinal centre line of the wedge and intersects both of the wedging faces 24 and 25 is inclined downwardly in a direction from the side wall 17 towards the side wall 18 and is also inclined downwardly in a direction towards the upright member 10. Since the narrower end of the wedge is lower than the wider end, gravity tends to urge the wedge towards its operative position and oppose withdrawal of the wedge from the aperture 22. Furthermore, withdrawal of the wedge from the aperture 22 involves raising the wider end of the wedge above the level of the upper edge of the transome 11. If boards 28 are resting on the transome, as shown in Figure 2, the boards will prevent withdrawal of the wedge from the aperture 22. It will be noted that, when the wedge is in its operative position, it lies entirely below the upper edge of the transome 11 so that the boards 28 can rest on the transome close to the upright member 10.

The upwardly facing surface of the transverse wall 19 of the socket constitutes a load-transmitting surface on the upright member 10 which is engaged by a load transmitting surface 29 on the end portion 15 of the transome. When the wedge 20 is driven in a direction from the side wall 17 towards and through the side wall 18 to its operative position, the surface 29 of the transome is urged into pressure contact with the transverse wall 19 along the entire length of this transverse wall. It will be understood that the transverse wall limits downward movement of the end portion 15 relative to the upright member 10. The end face 30 of the end portion 15 of the transome constitutes an abutment surface which, by engagement with an abutment surface on the upright member 10 limits movement of the transome towards the upright member. The abutment surface on the upright member. Alternatively, the plate 31 may be omitted. In the case where the plate 31 is provided, this is preferably of tapered form, being thinner at its upper end and thicker at its lower end. This form of plate provides an abutment surface which is inclined at a small angle to the longitudinal axis of the upright member. In this case, the end face 30 is inclined at an angle of slightly less than 90° to the longitudinal axis of the transome 11. With this arrangement, if the transome is raised slightly away from the transverse wall 19, engagement between the end face 30 and the abutment surface on the plate 31 is eliminated so that further upward movement of the transome is not impeded. It will be noted that the socket 16 is open at its upper side to facilitate removal of the transome.

Engagement between the end face 30 and the abutment surface of the plate 31 and engagement between the load transmitting surface 29 and the upwardly facing surface of the transverse wall 19 which is established by driving the wedge 20 into its operative position establishes a stable joint which prevents movement from a perpendicular relation between the transome and the upright member. Typically, the length of the load transmitting surfaces which are in mutual contact and the length of the abutment surfaces which are in mutual contact are approximately equal to the diameter or vertical dimension of the transome 11.

The transome 11 is preferably formed from a length of cylindrical metal tube although tube having an oval cross section may be used. The end portion 15 is integral with the remainder of the transome and is formed by collapsing an end portion of the tube to provide a flat intermediate part 32 along the upper and lower edges of which are respective ribs 33 and 34 which project from the intermediate part in the same lateral direction. As shown in Figure 2, the corresponding ribs at the opposite end of the transome project in the opposite lateral direction. The ribs 33 and 34 shown in the drawing are hollow, rounded beads. Alternatively, the ribs may be approximately of rectangular form with substantially flat upwardly and downwardly facing surfaces. There may be no significant gap between the adjacent parts of the tube wall from which each rib is formed. The slot which receives the wedge 20 is formed in the intermediate part 32 and this part is substantially vertical. The distance between the side walls 17 and 18 of the socket is such that the intermediate part 32 contacts the side wall 17 whilst the ribs 33 and 34 contact the side wall 18.

For receiving end portions of the ledgers 13 and 14, there are provided sockets 35 and 36 which are at diametrically opposite positions with respect to the upright member 10. The socket 16 is preferably spaced equally from the sockets 25 and 26 and is diametrically opposite to a socket 37 for receiving an end portion of the transome 12, when used.

It will be understood that the side wall 17, particularly the hook-shaped portion 26 thereof is inherently more vulnerable to mechanical damage than is the side wall 18. It will be noted that the apertured side walls are higher than the open side walls and that the apertured side wall of the socket 36 is adjacent to the open side wall 17 of the socket 16. Thus, some degree of protection against mechanical damage is afforded to the side wall 17 by the side wall 18 and the apertured side wall of the socket 36.

In Figure 4, there is illustrated a second example of scaffolding in accordance with the invention. Certain parts shown in Figure 4 correspond to parts previously described with reference to Figures 1 and 2. Such corresponding parts are indicated in Figure 4 by like reference numerals with the prefix 1 and the preceding description is deemed to apply, except for differences hereinafter mentioned.

Each joint of the scaffolding illustrated in Figure 4 includes an elongate retaining element in the form of a wedge 120. This wedge is not captive in the slot 123 of the end portion 115 of the transverse member 111 but is permanently attached to the end portion

by a flexible connecting element 145 formed of wire. The connecting element is sufficiently long to enable the wedge to be withdrawn completely from the slot 123 and from the side walls of the socket 116. Thus, it is not necessary for the socket to include an open side wall and in each of the side walls 117 and 118 there is formed an aperture, 121 and 122 respectively.

The position of the aperture 121 relative to the aperture 122 is such that, when the wedge 120 is in its operative position, the narrower end of the wedge is lower than the wider end and a plane which contains a longitudinal centre line of the wedge and intersects both of the mutually inclined wedging faces is inclined downwardly in a direction from the side wall 117 towards the side wall 118 and also inclined downwardly in a direction towards the upright member 110. The apertures 121 and 122 are sufficiently large to receive the wedge with sliding clearance and it will be noted that both apertures are rectangular in shape, there being no lateral projections on the wedge 120.

When the wedge 120 is in its operative position, it does not project above the level of the upper surface of the transverse member 111 and boards can rest on this transverse member close to the upright member 110. Since withdrawal of the wedge from the slot 123 involves upward movement of the wedge along a path which is inclined to the vertical, a board which rests on the transverse member can restrain movement of the wedge substantially out of its operative position.

Although not shown in Figure 4, there may be provided on the upright member 110 within the socket 116 a plate similar to the plate 31 shown in Figure 2 to provide an abutment surface for engagement by an end face of the transverse member 111. The abutment plate may bave f1 flanges which are welded to the upright member with the socket 116.

If an abutment plate is provided, then the end face of the transverse member is inclined to its longitudinal centre line. If no abutment plate is provided, then the end face of the transverse member 111 may be perpendicular to its longitudinal centre line. The form of the end portion 115 may be identical with that of the end portion 15 hereinbefore described.

For convenience of illustration, there is shown in Figure 4 only a single transverse member and a single socket on the upright member for receiving same, the transverse member being separated from the socket. It will be understood that there would normally be provided four sockets at the same position along the length of the upright member 110 for receiving end portions of corresponding transverse members, two of which may be transomes and a further two of which may be ledgers. The sockets would be identical with each other and arranged in diametrically opposite pairs as in the scaffolding illustrated in Figures 1 and 2.

In Figure 5, there is illustrated a part of an upright member and a single socket provided thereon of a third example of scaffolding in accordance with the invention. It will be understood that a further three sockets would normally be provided at the same position along the upright member but these further sockets have been omitted for simplicity of illustration. Each socket would receive an end portion of a transverse member identical with the end portion 15 hereinbefore described. Parts of the scaffolding illustrated in Figure 5 which correspond to parts previously described with reference to Figures 1 and 2 are indicated by like reference numerals with the prefix 2 and the preceding description is deemed to apply except for differences hereinafter mentioned.

In the scaffolding illustrated in Figure 5, the wedge 220 is held captive with respect to the end portion of the transverse member 211 by a structure welded to the end portion 215. The end portion 215 has substantially the same form as the end portion 15 described with reference to Figures 1 and 2. This structure comprises an outer wall 240 which is parallel to and spaced laterally from the intermediate part 232 of the end portion, an upper wall 241 which extends from an upper edge of the outer wall to an upper edge of the end portion 215 and an end wall 242 which spans the gap between the outer wall and the end portion at an extremity of the outer wall remote from the end face 230. The walls 241 and 242 are both integral with the outer wall 240 and are both welded to the end portion 215.

The wedge 220 is provided adjacent to its narrower end with one or two lateral projections and in the opposite walls of the socket 216 and in the intermediate part 232 of the end portion, there are formed respective apertures through which the narrower end portion of the wedge and the lateral projection or projections can pass. Thus, the wedge can be withdrawn completely from the socket and from the end portion of the transverse member. In the outer wall 240 there is provided a slot 243 through which the wedge projects. A part of this slot which is nearer to the end face 230 is inclined in the same manner as is the wedge when the latter is in its operative position; A part of the slot 243 remote from the end face 230 is arranged with its length parallel to a longitudinal centre line of the transverse member 211 and this part of the slot communicates with a corresponding slot in the end wall 242.

The respective widths of the slots 243 and the slot in the end wall 242 are such that the lateral projection or projections on the narrower end portion of the wedge cannot pass through the slots. The width of the gap between the outer wall 240 and the intermediate part 232 is less than the maximum width of the wedge. Accordingly, the wider end portion of the wedge cannot pass between the intermediate part 232 and the extremity of the outer wall 240 adjacent to the end face 230.

It will be noted that the slot 243 does not extend to this extremity of the outer wall. In all possible positions of the wedge, some part of the wedge occupies the slot 243 and/or the slot in the end wall 242.

When the wedge has been withdrawn completely from the socket 216 and from the intermediate part 232 of the end portion of the transverse member, the wedge can be moved along the slot 243 until is occupies a storage position shown in Figure 5 in which the length of the wedge is approximately parallel to a longitudinal centre line of the transverse

member 211. Since, in its storage position, the wedge lies alongside the transverse member and the narrower end portion of the wedge lies within the structure comprising the outer wall 140, the wedge is not very vulnerable to mechanical damage.

When the end portion 215 is to be introduced into the socket 216, the wedge 220 must first be moved from its storage position into the inclined part of the slot 243. This provides a sufficient gap between the wedge and the intermediate part 232 of the end portion to receive one wall of the socket. After the end portion has been introduced into the socket, the wedge is passed through the apertures in the walls of the socket and in the intermediate part 232 and driven home to tighten the joint.

Although for convenience only a single transverse member and single socket has been shown in Figure 5, it will be understood that there would normally be provided at the same position along the length of the upright member 210 four sockets for receiving associated transverse members. The sockets may be indentical with each other and each transverse member may be as illustrated in Figure 5.

In Figure 6, there is illustrated a joint in the upright member of each example of scaffolding hereinbefore described. For convenience, it will be assumed that the joint illustrated in Figure 6 is provided in the upright member 10 of the scaffolding illustrated in Figures 1 and 2.

Whilst sockets may be provided at positions spaced apart along the length of a single upright component with which all of the sockets are united, we prefer that a group of sockets at one position along the length of the upright member be provided on a component of the upright member which can be separated from a further component on which a further group of sockets are provided. Thus, as shown in Figure 6, the upright member 10 may comprise a lower tubular component 50 and a tubular component 51 to which the sockets 16, 35, 36 and 37 are welded. The component 51 is short, as compared with the component 50. The respective diameters of the components 50 and 51 are the same, so that the component 51 can rest on the component 50.

Within the component 50, there is secured a spigot 53 which projects upwardly from the component 50 and is received within the component 51. The component 51 is releasably secured to the spigot by a tapered pin 54 which extends through aligned apertures in the component 51 and the hollow spigot. These apertures are so arranged that the pin is inclined downwardly with its narrower end lowermost. The pin is tethered to the component 51 by a flexible connector 55.

When the tapered pin 54 has been driven home, it is a tight fit in the component 51 and in the spigot 53 with opposite end portions of the pin projecting at the outside of the component 51. The pin thereby maintains a predetermined angular relation between the component 51 and the component 50. By provision of a similar arrangement at another position along the length of the upright member 10, vertical alignment of sockets at different positions along the length of the upright member can be assured.

The cross section of the pin 54 is preferably round but a pin having a rectangular cross section may be used, the shape of the openings in which it is received being modified accordingly.

Figure 6 illustrates a joint between a lower end portion of the component 51 and the component 50. A similar joint may be provided between an upper end portion of the component 51 and a further tubular component of the upright member 10.

CLAIMS

1. In scaffolding comprising an upright member and a plurality of transverse members connected to the upright member by respective joints, a joint between the upright member and a transverse member, which joint comprises a pair of horizontally spaced side walls on one member, a portion of the other member which is received between the side walls and a retaining element which is driven along a path extending from one side wall to the other side wall into an operative position in which the retaining element is engaged with both of the side walls and with said portion in a manner to retain said portion in a predetermined position relative to the side walls.

2. A joint according to claim 1 further comprising respective load-transmitting surfaces on said members, which surfaces engage each other to limit downward movement of the transverse member relative to the upright member.

3. A joint according to claim 2 wherein the load transmitting surface on said one member extends between the side walls.

4. A joint according to claim 3 wherein the load transmitting surface on said one member faces towards a gap between the side walls and is on a transverse wall which, together with the side walls, forms a generally U-shaped socket.

5. A joint according to any preceding claim wherein the side walls are provided on the upright member and said portion which is received between the side walls is an end portion of the transverse member, being integral with a tubular portion of the transverse member and formed by deformation of an end portion of a tube.

6. A joint according to any preceding claim further comprising respective abutment surfaces on said members which engage each other to limit movement of the transverse member towards the upright member.

7. A joint according to any preceding claim wherein the retaining element is of elongate form and the side walls are spaced apart along the length of the retaining element.

8. A joint according to claim 7 wherein a longitudinal centreline of the retaining element is inclined downwardly.

9. A joint according to any preceding claim wherein the retaining element is a wedge.

10. A joint according to claim 7 or claim 8 or according to claim 9 as appendant to claim 7 or claim 8 wherein the retaining element is received in respective apertures formed in said portion of the other member and in at least one of the side walls.

11. A joint according to claim 10 wherein the other side wall is formed with an opening to receive the retaining element without encircling the retaining element.

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